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4 NOISE BACKGROUND REPORT

4.1 PURPOSE OF THE NOISE ELEMENT AND BACKGROUND REPORT

The purpose of the Noise Element is to protect the community from exposure to an undesirable level of noise and to provide a basis for promulgating noise standards and abatement guidelines for existing and projected noise sources. The most common sources of environmental noise in San Bernardino County (County) are associated with roads, airports, railroad operations, and industrial activities. These facilities are used to transport residents, consumer products, other goods and services, and provide basic infrastructure for the community by creating jobs and economic stability. In many areas within the County, noise-sensitive land uses such as residences, schools, churches, parks etc. exist in proximity to these major noise sources. In order for the various elements of the society to coexist, noise levels need to be controlled and minimized to limit exposure to residential communities and other noise-sensitive land uses. To ensure a community atmosphere free of undesirable noise, planners and developers use the noise standards and abatement recommendations as guidance when determining compatibility of new development such as roads, transit facilities, and commercial/industrial development with potentially noise-sensitive uses like residential neighborhoods, medical facilities, cultural and recreational venues, churches, and parks. Hence, the Noise Element relates directly with the Land Use, Circulation, Open Space, and Housing Elements.

The Noise Background Report identifies and provides an appraisal of major mobile and stationary noise sources, existing and projected levels of noise, existing sensitive receptor types, and discusses noise exposure in the community. Using data from the Noise Background Report, County decision-makers may take actions to avoid noise/land use conflicts, select and impose methods of noise abatement to protect residences and other sensitive receptors from excess noise, and to resolve noise complaints. In addition, the County may choose preferred types of implementation measures and identify possible solutions to address existing and foreseeable noise problems.

The information provided in this Noise Background Report consists of: a general discussion of existing federal/state/local laws, ordinances, regulations, and standards pertinent to environmental noise assessment and control, existing noise levels from representative major sources including freeways, rural and suburban arterial highways; industrial and commercial activities (i.e., railroads/yards, airports, factories, etc.); recreational areas and related activities and their potential impact on noise sensitive facilities; and areas within the County (e.g., residential areas, schools, hospitals, etc.). To illustrate the existing noise environment in the County, the physical proximity of major noise sources and nearby receptors was assessed in part using Geographical Information System (GIS) data overlaid onto County base maps. Additionally, characteristics of the existing noise environment were discussed. The sources of information used to prepare this report are listed in the references and bibliography section of this report.

A comprehensive, well-structured Noise Element allows the County to establish its standards and guidelines for community noise issues assessment including:

- Development of baseline specifications;
- Evaluation of new residential and other sensitive uses for consistency with noise standards in areas adjacent to major sources of noise;
- Correlation of noise concerns with objectives, policies and plan proposals of the Land Use, Circulation, Housing, and Open Space elements;
- Achievement of noise compatibility among residential, commercial, industrial and other surrounding land uses;
- Guidance for the location and design of transportation facilities to maintain acceptable noise levels;
- Controlling stationary noise at the source through siting guidelines and the use of noise attenuation techniques; and
- Establishing noise standards for reviewing development that generates or is sensitive to noise.

4.1.1 INTRODUCTION

The County is updating its General Plan. This includes reviewing, revising, and modifying all the elements in the General Plan. As part of the review process, a background report providing updated information is prepared for each element in the existing General Plan. Each background report provides information pertaining to the corresponding element, serving as a technical resource for the General Plan update and related environmental documents and actions required by the California Environmental Quality Act (CEQA).

Noise has long been accepted as a byproduct of urbanization and is considered a potential environmental hazard. Excessive and/or sustained noise can contribute to both temporary and permanent hearing loss, and may be associated with increased fatigue, stress, annoyance, anxiety, and other psychological reactions in humans. Therefore, environmental noise levels are monitored and regulated to minimize exposure and alleviate potential adverse effects on the public.

Section 4.1.2 concludes the introduction with a discussion of the approach and methodology employed to complete the Noise Element update. Section 4.2 identifies the public's concerns regarding noise and the General Plan update. Section 4.3 quantitatively describes the existing noise conditions throughout unincorporated areas of the County. Section 4.4 lists critical issues to be addressed and Section 4.5 provides lists of references, resource documents, persons consulted, authors, a glossary, and acronym list.

Appendix A defines the concepts of sound and noise and describes the noise metrics used in this report. Readers who are unfamiliar with acoustics and its terminology are strongly recommended to review Appendix A. Appendix B contains documentation and results of the noise measurement program conducted for this report. Appendix C lists the input and output data from the noise modeling performed for this report along with aircraft noise contours. Appendix D contains the existing noise ordinance for the County.

4.1.2 APPROACH/METHODOLOGY

The approach and methodology used to prepare this document was to research and review currently available environmental noise information, model existing noise sources as necessary, and conduct noise measurements within the County to describe the existing noise environment. The review of documents produced data used to formulate noise contours in tabular format for major noise sources. Other noise contours are based on computer modeling of traffic conditions at selected major roadways and regional arterial highways. In addition, representative short-term (typically 15 to 20 minutes duration) and long-term (generally 15 to 24 hours duration) measurements of ambient noise were conducted at representative areas throughout the County to describe typical noise environments in the County and to confirm the accuracy of traffic noise modeling.

Per California Code of Regulations Section 65302(f), the Noise Element is required to illustrate noise contours around major noise sources such as highways, freeways, primary arterial roads and major local streets, railroad operations, mass transit operations such as trains and airports, and industrial and commercial stationary sources. Due to the large area of the County and the desire to enhance the clarity and usefulness of exhibits, noise contours were developed for these facilities using selected, representative examples typical of selected major noise sources (e.g., large airports, major arterials, interstate highways, major rail lines). These representative examples were aggregated as appropriate based upon differences in traffic volumes and speeds. Potential noise levels from other similar noise sources may be determined based on a comparison method. For example, a particular traffic noise level would occur at consistent distances from various roadway segments in the County that have similar traffic characteristics such as the average daily traffic (ADT), vehicle speed, and mixture of vehicle types. Thus, by referring to the table of ADT for roadway segments within the County (found in the Circulation background report) and the calculated distances from the highway to a criterion traffic noise level, one can readily determine the extent of traffic noise adjacent to a busy highway throughout the County areas.

The illustrated noise contours associated with intensive railroad activity are generalized based on currently available information. A detailed representation of railroad noise (and perhaps ground-borne vibration) would need to be generated on a site-specific basis. The concept critical to this Noise Element is that any/all tracks with rail activity (or roadways with high traffic activity) may generate adverse noise levels depending on the type and proximity of adjacent land use.

4.2 IDENTIFICATION OF PUBLIC CONCERNS

As part of the County's General Plan update process, community meetings were held at several locations within the County to gather informative data and input from residents. Questions were posed to the attendees regarding the growth and development in their community, to inquire about their concerns, and about what could be done to address their concerns. Noise was mentioned in several of the community meetings as being an issue of concern. Additionally, concern was expressed by citizens and staff regarding the efficacy of the noise complaint process and enforcement of noise regulations. The information contained within this Background Report and the General Plan update responds to these concerns.

4.3 EXISTING CONDITIONS

San Bernardino County is located in the southeast area of the state of California. The western boundary of the County is approximately 60 miles inland from the Pacific Ocean extending eastward to the Arizona and Nevada borders. The County encompasses approximately 20,105 square miles and has the largest land area of any county in the contiguous 48 states of the United States. The County is larger than the states of Rhode Island, Delaware, Massachusetts, New Jersey, Maryland, Hawaii, Connecticut, New Hampshire, and Vermont (County of San Bernardino, 1989 (Land Use Background Report)). San Bernardino County is bordered by the San Bernardino and San Gabriel Mountains to the southwest, the Tehachapi Mountains to the northwest, and the Colorado River and the states of Nevada and Arizona to the east.

The County has three major regions: the San Bernardino Valley, the San Bernardino Mountains, and the Mojave Desert. Much of the County is desert, with the mountains and the valley in the southwest corner. The Mojave National Preserve covers most of the desert; the mountains are located in the San Bernardino National Forest, and the valley in the eastern end of the San Gabriel Valley. Because of these distinct regions, the County identifies three major regions – Valley, Mountain, and Desert.

The unincorporated and residential areas, along with noise-sensitive receptors and potential noise generators, are shown in Figure 4-1A, 4-1B, and 4-1C, for each region. Focusing on unincorporated areas of the County, noise-sensitive receptors include amphitheaters, campgrounds, residential areas, fire stations, schools, hotels and libraries[1]. Potential major noise generators include roadways, airports, industrial plants, railroads, racetracks, off-highway vehicle areas and public shooting ranges.

Section 4.3.1 lists the federal, state and county (local) noise guidelines, regulations and standards. Sections 4.3.2 and 4.3.3 address the measurements and modeling conducted for this report. Section 4.3.4 draws conclusions from the previous sections.

4.3.1 NOISE LEVEL STANDARDS

4.3.1.1 FEDERAL GUIDELINES AND STANDARDS

There are guidelines at the Federal level that direct the consideration of a broad range of noise and vibration issues as listed below:

- National Environmental Policy Act (42 U.S.C. 4321, et. seq.) (PL-91-190) (40 C.F.R. 1506.5);
- Noise Control Act of 1972 (42 U.S.C. 4910);
- Federal Aviation Administration (FAA) Regulations (FAR) Parts 36, 91, 150 and 161.

[1] Depending on the type of event occurring at an amphitheater, it can be considered a noise-sensitive receptor or a noise generator. It is commonly classified as a noise-sensitive receptor. For example, the US Department of Transportation considers outdoor amphitheaters and concert pavilions as tracts of land where quiet is an essential element in their intended purpose and categorizes them as being more noise-sensitive than residences. As most fire stations contain sleeping quarters, they are classified as noise-sensitive receptors. As hotels contain sleeping quarters, they are classified as noise-sensitive receptors. The US Department of Transportation applies the same noise abatement criteria to hotels and residences and buildings where people normally sleep.

- Department of Defense Air Installation Compatible Use Zones (AICUZ) Program (C.F.R. Title 32, Part 256)
- Federal Interagency Committee on Urban Noise (FICUN, Guidelines for Considering Noise in Land Use Planning and Control, 1980)
- Federal Interagency Committee on Noise (FICON, Federal Agency Review of Selected Airport Noise Analysis Issues, 1992)
- Federal Interagency Committee on Aviation Noise (FICAN, 1993)
- Federal Railroad Administration (FRA) Guidelines (Final Draft, Report No. 293630-1, Contract DTFR53-94-A-00056; FRA, 1996);
- Federal Transit Administration (FTA) Guidelines (DOT-T-95-16, April 1995);
- Environmental Protection Agency (EPA) Railroad Noise Emission Standards (40 C.F.R. Part 201) and FRA Railroad Noise Emission Compliance Regulations (49 C.F.R. Part 210);
- Federal Highway Administration (FHWA) Noise Abatement Procedures (23 C.F.R. Part 772);
- Department of Housing and Urban Development (HUD) Environmental Standards (24 C.F.R. Part 51);
- Occupational Safety and Health Administration (OSHA) Occupational Noise Exposure; Hearing Conversation Amendment (FR 48 (46), 9738--9785 (1983);

Additional noise emission/exposure guidelines, regulations, codes, and statutes exist that are promulgated and/or enforced by various federal agencies including the National Park Service, the US Coast Guard, Fish and Wildlife Service, etc. that are focused on their respective areas of expertise.

The EPA has published a guideline ("Levels" Document, Report No. 556/9-74-664) containing recommendations for noise levels affecting residential land use of 55 dBA DNL for outdoor living areas and 45 dBA DNL for indoor living areas. The agency is careful to stress that the recommendations contain a margin of safety and do not consider technical or economic feasibility issues, and therefore should not be construed as standards or regulations.

4.3.1.2 STATE OF CALIFORNIA

State of California regulations and guidelines include the following:

- CCR 65302F requiring local jurisdictions to prepare General Plans that include Land Use and Noise Elements. Noise Elements must use the CNEL or alternatively the L_{dn} noise descriptor.
- California Energy Commission (CEC) Power Plant Siting Regulation
- Airport Noise Standards (CCR, Title 21)
- The Cal/OSHA standard (8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Section 5095)
- California Department of Transportation (Caltrans) "Highway Traffic Noise Abatement Guidelines", Chapter 1100 of the Caltrans Highway Design Manual, and Chapter 2.4 of the Caltrans "Traffic Noise Analysis Protocol"

- State Building Code (Part 2, Title 24, CCR) and Appendix Chapter 35, Sound Transmission Control
- Various sections of the California Vehicle Code, Penal Code, etc. relating to motor vehicle noise emission, loud car stereo, disturbing the peace, etc.

4.3.1.3 COUNTY OF SAN BERNARDINO (LOCAL) GUIDELINES AND STANDARDS

The County regulates noise from sources that are not pre-empted by State or federal jurisdiction. Such sources include project construction activities, stationary sources such as fans, pumps, compressors or other mechanical equipment, or mobile sources operating on private property. Chapter 9 (Section 87.0905) of the County's noise ordinance sets forth performance standards for affected (receiving) land uses from stationary and mobile sources, during daytime (7 AM to 10 PM) and nighttime (10 PM to 7 AM) periods. Exemptions from these standards include motor vehicles not under the control of the industrial use, emergency equipment, vehicles and devices, and temporary construction and repair or demolition activities taking place between the hours of 7 AM and 7 PM Monday through Saturday, excluding Federal holidays. The County's noise ordinance is included in this report as Appendix D.

The County has promulgated and implemented noise policies and requirements for land development and construction projects by requiring these projects to provide specific noise analyses and implement any necessary measures to reduce noise to an acceptable level.

4.3.2 NOISE MEASUREMENTS

A noise survey was conducted from May 24 through June 11, 2004 in order to document and evaluate existing sound levels in the County. Measurements were conducted at representative locations in and adjacent to a variety of land uses including residential, recreational, institutional (i.e., schools), open space, agricultural, commercial and industrial.

Generally the noise measurement sites were selected to be representative of noise-sensitive uses with "worst-case" noise exposure to major, nearby noise sources such as freeways, highways, rail lines or airports. To aid site selection, "Residential" (and other noise sensitive) land use within unincorporated San Bernardino County was identified using GIS/County maps, and is shown on Figure 4-1A, 4-1B, and 4-1C, for Valley, Mountain and Desert regions, respectively. The figures also show major noise sources in the County which primarily consist of transportation-related facilities such as highways and freeways, primary arterials and major local streets, rail operations, and commercial and military airports. Additional noise sources in the County consist of industrial facilities, commercial activities, and mining operations. Certain land uses within the County may be both noise-sensitive and noise generators. Examples of these uses include schools, fire stations, transient residential, and some houses of worship.

Short-term (attended) sound level measurements were conducted with Brüel and Kjær Model 2231 and Brüel and Kjær Model 2236 Sound Level Meters (SLMs). These instruments are categorized as Type 1 - Precision Grade. In addition to the SLMs used for the short-term measurements, unattended Community Noise Analyzers (CNAs) measured noise levels continuously, in 10 to 15-

minute intervals, during 15-hour or more periods at selected locations from May 24 to June 11, 2004. The instruments used for the long-term noise measurements were Metrosonics db-308 CNAs, Brüel and Kjær Model 2236 SLMs and Larson-Davis Model 820 CNA.

The sound measuring instruments used for the survey were set to the Slow time response and the A-weighted decibel (dBA) scale for all of the noise measurements. To ensure accuracy, the laboratory calibration of the instruments was field checked with an acoustical calibrator before and after each measurement period. The accuracy of the acoustical calibrator is maintained through a program established through the manufacturer and is traceable to the National Institute of Standards and Technology. The sound measurement instruments meet the requirements of the American National Standard S 1.4-1983 and the International Electrotechnical Commission Publications 804 and 651. Appendix B.4 provides the calibration documentation for the applicable instrumentation. In all cases, the microphone height was 5 feet above the ground and the microphone was equipped with a windscreen.

The short-term (ST) and long-term (LT) monitoring locations are shown in overview form in Figure 4-2A, 4-2B, and 4-2C. Appendix B documents the ST and LT measurements and their locations in detail. Table 4-1 and Table 4-2 summarize the results for the LT and ST measurements, respectively.

Figure 4-1A. Valley Region Map

Figure 4-1B. Mountain Region Map

Figure 4-1C. Desert County Region Map

Figure 4-2A. Noise Measurement Locations in the Valley Region

Figure 4-2B. Noise Measurement Locations in the Mountain Region

Figure 4-2C. Noise Measurement Locations in the Desert Region

Table 4-1. Summary of Long-term Noise Measurement Data

Region	Measurement ID	Location	2004 Start Date	Start Time	Duration (hours)	Loudest Hour			Quietest Hour			DNL (dBA)*
						2004 Date	Time	L_{eq} (dBA)	2004 Date	Time	L_{eq} (dBA)	
Desert	LT-1-1	SE of intersection of SR62 and Easy Street, Twentynine Palms/Wonder Valley	9-Jun	15:45	44	9-Jun	16:00	72.9	10-Jun	4:00	55.8	68
	LT-9-1	Lenwood Elementary School, Lenwood	8-Jun	16:45	44	9-Jun	15:00	73.1	10-Jun	3:00	50.9	67
	LT-11-1	Parker Dam Elementary School, Parker Dam	10-Jun	16:00	15	11-Jun	6:00	47.3	11-Jun	2:00	35.9	50**
Mountain	LT-12-1	Across from 38686 SR38, Fawnskin	8-Jun	10:30	26	9-Jun	8:00	62	9-Jun	1:00	39.5	60
Valley	LT-20-1	9697 Locust, opposite Mary B. Lewis School, Bloomington	24-May	15:00	48	25-May	17:00	62.8	25-May	2:00	46.9	63
	LT-25-1	SW corner of Mentone and Agate, Mentone	2-Jun	10:00	29	3-Jun	7:00	68.4	3-Jun	2:00	49.5	66

* of most representative 24-hour period

** 15 hours only

Table 4-2. Summary of Short-term Noise Measurement Data

Region	Measurement ID	Location	Measurement Period			Noise Sources	Results, dBA					
			Start Date of 2004 (dd-mmm)	Start Time (hh:mm, 24-hour format)	Duration (minutes)		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Desert	ST-1-1	200 ft N of Amboy Rd on Feldeman Rd; Wonder Valley	9-Jun	15:35	5	distant Traffic; wind; Lmin & L90 represent non-wind conditions	N/A	N/A	40.9	48.5	N/A	N/A
	ST-2-1	Park Blvd, N of Desertair Rd; 20 ft E of centerline; Joshua Tree (S of SR62)	9-Jun	16:35	20	distant barking dogs, birds, distant traffic, distant radio, local traffic was dominant	59.8	76.4	37.0	41.0	48.5	64.0
	ST-3-1a	east side of Morongo Valley Elementary School; Morongo Valley	9-Jun	12:05	1	winds 10-25 mph, gusts to 32 mph; only Lmin and L90 represent non/low-wind conditions	N/A	N/A	53.7	55.0	N/A	N/A
	ST-3-1b		9-Jun	12:24	1		N/A	N/A	54.0	55.0	N/A	N/A
	ST-3-1c		9-Jun	12:27	2	children playing	65.7	72.0	55.1	59.5	65.0	69.0
	ST-5-1a	Pioneer Park on Hwy 247; between Branch Library and Fire Station; Lucerne Valley	8-Jun	11:20	20	children playing	68.4	91.7	54.5	59.9	63.0	68.0
	ST-5-1b		8-Jun	11:40	20		66.7	87.7	51.4	59.0	63.0	69.0
	ST-6-1	recreation area at N end of lake; 105 ft (approx) N of 27670 Lakeview Dr; Helendale	3-Jun	11:55	20	traffic; rustling leaves, birds, distant traffic, distant trains	49.5	68.7	34.7	38.0	44.0	53.0
	ST-7-1	Phelan Elementary School (grassy playground next to 3rd grade classrooms); Phelan	3-Jun	14:05	15	aircraft overhead, rustling leaves, distant children playing	58.0	68.9	51.0	53.5	56.0	61.0

Table 4-2. Summary of Short-term Noise Measurement Data Continued

Region	Measurement ID	Location	Measurement Period			Noise Sources	Results, dBA					
			Start Date of 2004 (dd-mmm)	Start Time (hh:mm, 24-hour format)	Duration (minutes)		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Desert Continued	ST-8-1	Across street from 334 4th St; On NE corner of 38654 4th St property yard; Yermo	10-Jun	12:45	10	distant barking dogs, birds, distant traffic, woman yelling in house, UPS truck passby, some hammering	54.9	77.8	48.8	49.7	50.8	56.5
	ST-10-1	Baker Valley HS (front lawn); Baker	8-Jun	15:00	20	rustling leaves, flag pole tapping; parking lot activity	55.4	63.9	48.0	51.0	54.5	57.5
	ST-11-1	Black Meadows Landing Campground; pad 116; Parker Dam/Earp/ Big River	10-Jun	15:53	20	aircraft overhead, birds, air conditioning unit on RV 2 pads away	45.1	64.0	36.0	40.5	41.5	43.5
	ST-11-2	Parker Dam Elementary School; at NE corner; Parker Dam/Earp/ Big River	11-Jun	6:53	10	distant birds, distant landscaping (water sprinkler), insects	37.4	44.5	33.5	34.5	36.5	40.5
	ST-11-3	Crossroads Campground; on Colorado River; at picnic table; Parker Dam/Earp/ Big River	11-Jun	7:54	10	birds, distant traffic on AZ 95; boat passbys	47.7	63.9	35.0	38.5	44.5	51.0
	ST-11-4	150278 Arizona St; Parker Dam/Earp/ Big River, CA	11-Jun	9:20	10	distant aircraft, birds in nearby trees, distant barking dogs, transformer hum (124 yds)	47.5	63.8	35.0	37.5	40.5	50.0

Table 4-2. Summary of Short-term Noise Measurement Data Continued

Region	Measurement ID	Location	Measurement Period			Noise Sources	Results, dBA					
			Start Date of 2004 (dd-mmm)	Start Time (hh:mm, 24-hour format)	Duration (minutes)		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Mountain	ST-12-2	46195 Skyview near corner of forest Hill; Big Bear	2-Jun	11:20	20	traffic, birds, distant traffic, chimes, wind	45.8	58.3	35.2	39.0	44.0	49.0
	ST-12-2	40162 North Shore Dr, 90 ft S of North Shore Dr; Fawnskin	2-Jun	13:15	20	traffic, distant construction noise, wind chimes	58.0	72.9	31.9	35.5	45.0	63.5
	ST-13-1	31826 Hwy 18 (Rim of the World Hwy), Running Springs	2-Jun	14:25	20	traffic, birds, distant landscaping	64.2	83.7	39.5	50.0	59.5	67.0
	ST-14-1	27263 Hwy 18, adjacent to Unit 1, W of ice rink; Blue Jay	2-Jun	15:30	20	traffic (heavy trucks), distant children playing	62.7	81.7	38.9	54.0	58.5	63.5
	ST-15-1	Mountain High School, Crestline	2-Jun	16:20	20	traffic, distant aircraft, barking dogs, children playing, distant construction	57.5	78.5	39.0	41.0	47.5	58.5
	ST-17-1	5942 Walnut St, Wrightwood (at SR 2)	3-Jun	14:55	20	traffic on SR 2, distant construction	63.0	76.5	39.6	46.5	60.0	67.0
	ST-17-2	8317 US 138, at the Best Western Hotel; Cajon Pass	3-Jun	15:35	15	traffic on I15, trains	67.2	74.1	61.2	65.0	67.0	69.0

Table 4-2. Summary of Short-term Noise Measurement Data Continued

			Measurement Period				Results, dBA					
Region	Measurement ID	Location	Start Date of 2004 (dd-mmm)	Start Time (hh:mm, 24-hour format)	Duration (minutes)	Noise Sources	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Valley	ST-16-1	Near 18386 Santa Fe Ave, 120 ft W of intersection of Santa Fe Ave and Devore Rd; Devore	26-May	11:30	20	rail (1 long), traffic on Devore Rd, 2 passbys on Santa Fe Ave, barking dogs, birds, distant traffic on I15 and I215	57.2	77.2	49.1	51.0	53.5	59.0
	ST-18-1	4700 Phillips Way; 60 N of intersection with Phillips Way; Chino	24-May	16:50	20	traffic, aircraft overhead (heavy jet departure), rustling leaves, distant barking dogs, birds, distant children playing, distant trains, distant ice cream truck	57.8	71.7	45.8	50.0	54.0	61.0
	ST-19-1	corner of Randall & Eugenia; 25 ft N of Randall; Fontana area	24-May	15:35	20	traffic, distant barking dogs, birds, children playing, distant trains, wind chimes	63.3	77.0	47.6	53.0	61.5	66.0
	ST-20-1	18923 Arabian Ct; front yard, near Appaloosa Ln; Colton	24-May	12:00	20	traffic, aircraft overhead (3 large, props), birds, distant children playing, distant traffic, distant fire engines, electronic chimes, heavy truck @ 100 ft	54.2	74.8	39.9	44.5	49.0	56.0
	ST-20-2	701 C St, near Tejon Ave, Colton	26-May	14:45	20	traffic, distant trains	61.6	70.9	49.4	52.5	58.0	65.5
	ST-21-1	3795 3rd Ave, near Cajon Blvd; Muscoy;	26-May	12:15	20	traffic, distant aircraft, distant trains, distant industrial	53.7	71.6	44.7	47.0	49.5	55.5
	ST-22-1	24196 4th St, San Bernardino	26-May	13:50	20	traffic, birds	60.3	72.0	48.4	54.0	58.5	62.0
	ST-22-2	Monterey School, 40 ft S of 5th St, E of Waterman Ave; San Bernardino	3-Jun	13:50	20	traffic, distant aircraft, occasional distant PA systems (school and hvy truck facility)	68.2	79.8	48.1	50.1	60.1	73.3

As shown in Table 4-1, six LT measurements were conducted – three in the Desert region (Wonder Valley LT-1-1, Lenwood LT-9-1 and Parker Dam LT-11-1), one in the Mountain region (Fawnskin LT-12-1) and two in the Valley area (Bloomington LT-20-1, Mentone LT-25-1). The durations of the LT measurements, with the exception of LT-11-1, were 26 to 48 hours. The duration of LT-11-1 was 15 hours, primarily during nighttime. Desert DNL ranged from 50 dBA to 68 dBA. The DNL at the one Mountain location was 60 dBA and Valley DNL were 63 dBA and 66 dBA.

Table 4-2 summarizes the short-term noise measurements conducted at 27 representative measurement sites. Twelve of the sites were located in the Desert region (ST-1-1 through ST-11-4). Seven sites were located in the Mountain region (ST-12-1 through ST-15-1, and ST-17-1 and ST-17-2) and eight were located in the Valley region (ST-18-1 through ST-22-2, and ST-16-1). Most of ST measurements had durations of 10 to 20 minutes and were conducted during daylight hours. During the field measurements, physical observations of the predominant noise sources were noted. The noise sources in the project area typically included local and/or distant traffic, trains, aircraft, birds, and children playing. It is interesting to note that playing children has values of L_{eq} similar, if not greater in some case, than values of L_{eq} primarily due to vehicle traffic.

Measured ST L_{eq} in the Valley region ranged from 54 dBA to 68 dBA. The minimum L_{eq} was measured in Muscoy off of 3rd Avenue at ST-21-1. The maximum L_{eq} was measured in San Bernardino near Monterey School at ST-22-2. Both locations are affected by noise from local traffic, and slightly affected by noise from distant aircraft and distant industrial sources. Measured ST L_{eq} in the Mountain region ranged from 46 dBA to 67 dBA. Measured ST L_{eq} in the Desert region ranged from 37 dBA to 68 dBA. The measurements indicate that the primarily rural Desert and Mountain regions can be as noisy as the primarily urban Valley region, depending on the noise source and its proximity to noise-sensitive receptors. The primary noise sources included traffic from I-15 and train passbys for the measurement of 67 dBA L_{eq} at ST-17-2 in the Cajon Pass. This location is characterized as a commercial or noisy urban setting[2]. For the measurements characterized as being in a normal suburban[3] setting, children playing and vehicular traffic were the primary noise sources. For the measurements characterized as being in a quiet suburban[4] setting, wind and traffic were primary noise sources however, no particular noise source dominated the environment. For the measurements characterized as being in a rural setting, traffic, wind and no particular source were equally common.

4.3.3 NOISE MODELING

Modeled mobile noise sources are associated with motor vehicle traffic on highways and major arterial roadways, railroad trains, and aircraft at airports. The following three subsections discuss traffic, railroad and aircraft noise. Section 4.3.3.4 addresses industrial noise.

[2] Noisy urban is defined as densely populated residential (high-rise apartment buildings or multi-family housing) and/or large commercial/industrial land use (FAA, 1999)

[3] Normal suburban is defined as single-family detached housing on 0.25-0.33 acre lots with scattered commercial or industrial land use (FAA, 1999)

[4] Quiet suburban is defined as single-family detached housing on lots greater than 0.33 acre with few or no commercial or industrial land use (FAA, 1999)

4.3.3.1 TRAFFIC NOISE

The level of noise associated with roadways will vary with total traffic volume, vehicular speed, the relative numbers of trucks and cars in the traffic volumes, the roadway cross-section and geometric design, and the local topography. Typically, the greater the vehicle speed and truck percentage, the greater the level of noise emission from the transportation facility.

Various types of surface transportation facilities exist within the unincorporated portion of San Bernardino County. These facilities include California and Interstate limited-access freeways, state-designated routes and highways, plus local jurisdiction roads. Appendix C.1 tabulates the considered roadways. These roadways consisted of freeways (e.g., I-10, I-15), rural/suburban arterials (e.g., US-95, SR-62) and urban arterials (e.g., major boulevards, avenues and segments of stage routes).

Noise levels from traffic were estimated using the FHWA Traffic Noise Model (TNM®). TNM® is FHWA's most recent computer program for highway traffic noise prediction and analysis. The most recent version of TNM® (version 2.5) was used for this project. The input parameters used in this study for modeling traffic noise included traffic volumes, truck/auto percentages (i.e., "traffic mix"), average travel speeds, and distance from source to receptor. For the purposes of a large-scale, generalized study such as this one, the effects on noise from source-receptor geometry, intervening terrain or structures were not considered.

Traffic volumes and mix were derived from the traffic study conducted for the project and from automated Caltrans traffic counts, respectively. The traffic volume and speed data from the traffic report were analyzed and two roadway groups were identified. The first roadway group is composed of two roadway types – rural and suburban arterials. The second roadway group consists of freeways. For rural or suburban arterials, two vehicle speeds (35 mph and 45 mph) were modeled for five ADT values using the average mix of vehicle types ranging from 5,000 ADT to 55,000 ADT. For freeways, four ADT values at one speed (65 mph) with the average mix of vehicle types were modeled. Appendix C contains the detailed modeling data and results. The noise model output is in terms of L_{eq}. For the purposes of this study, the L_{eq} output was converted to the corresponding DNL level using the long-term noise measurement data. The difference between the peak-noise-hour L_{eq} and the DNL for each of the six long-term noise measurements was averaged, and found to be approximately 0.6 dBA (i.e., the DNL was approximately 0.6 dBA less than the peak-noise-hour L_{eq}. This difference was then applied to the L_{eq} output to arrive at the corresponding DNL level.

The predicted existing noise levels from the traffic noise model adjacent to major transportation facilities within the County are presented in Table 4-3 in the form of the distances from the roadway centerline to the 60 dBA DNL and 65 dBA DNL contours. For rural or suburban arterials, distances from the roadway centerline to the 65 dBA DNL contour range from 30 feet (ft) for 5,000 ADT at 35 mph to 250 ft for 55,000 ADT at 45 mph. For freeways, distances from the roadway centerline to the 65 dBA DNL range from 360 ft for 28,000 ADT to 1,770 ft (approximately 1/3 mile) for 225,000 ADT.

Table 4-3. Estimated Distances to DNL Contours from Representative Roadways in San Bernardino County

Representative Roadway Type	Average Daily Traffic (vehicles)	Percentage of Average Daily Traffic			Speed (mph)	Estimated Distance from Centerline to DNL Contour (ft)	
		Autos	Medium Trucks	Heavy Trucks		65 dBA	60 dBA
Rural or Suburban Arterial	5,000	92%	4%	4%	35	30	80
					45	50	120
	15,000				35	90	220
					45	140	330
	25,000				35	140	350
					45	220	440
	40,000				35	150	380
					45	230	500
	55,000				45	250	600
Freeway	28,000	89%	4%	7%	65*	360	790
	75,000					570	1100
	125,000					750	1500
	225,000					900	1770

Source: URS analysis
* Heavy trucks were assumed to be traveling at 60 mph

4.3.3.2 RAIL NOISE

Railroad activity, including heavy rail locomotives and railcars, also constitute a major but less widespread element of the noise environment in the County. The passage of trains results in considerable noise impacts to adjacent lands, although the elevated noise levels are periodic and of relatively short duration. Railroad tracks within the County are used for passenger transportation and delivery of freight. These railroad tracks interconnect with adjacent counties and ultimately other states and extend from the southwest boundary of the County in a northerly direction toward the City of Barstow where they split off in a westerly to easterly direction, between the City of Lancaster and Needles.

Noise from rail activity was estimated using available data on freight and passenger train schedules, speeds, consists and routes. A noise model developed for the FTA was used to generate a series of noise contours based upon the data compiled for this analysis. Appendix C contains the detailed modeling data and results.

The distance from the rail centerline to the 60 dBA DNL and 65 dBA DNL contours are presented in Table 4-4. An intensively utilized train line (i.e., 8 trains per hour, on average) with a speed of 45 mph, like the line between Colton and Cajon Junction, generates 65 dBA DNL at a distance of 500 ft from the rail centerline whereas a less intensively utilized train line (i.e., 4 trains per hour, on average, at the same speed) generates 65 dBA DNL at a distance of 700 ft from the rail centerline.

Table 4-4. Estimated Distances to DNL Contours from Representative Railroads in San Bernardino County

Train Line[1]	Average		Typical Temporal Distribution of Trains		Speed (mph)	Distance to DNL Contour (ft)	
	Train Count per Hour	Number of Engines / Cars per Train	Daytime (7 am - 10 pm)	Nighttime (10 pm - 7 am)		65 dBA	60 dBA
Intensively utilized line (i.e., Colton - Cajon Junction)	8.4	4 / 125	62.5%	37.5%	35	400	800
					45	500	1200
Less intensively utilized	4				35	250	500
					45	350	700

Source: URS Analysis

1 - Assumptions for track usage based upon available data from Union Pacific, Burlington Northern, Amtrak and Metrolink.

4.3.3.3 AIRCRAFT NOISE

Aircraft noise generates occasional, but intrusive noise levels to the occupants of property adjacent to airports and/or under the flight patterns of aircraft using airports. Tables C.3-1 and C.3-2 of Appendix C.3 list the airports within the County. Appendix C.3 contains noise contour figures for 18 airports within the County as provided by the County from their 1989 Noise Element[5]. Contours for Ontario International Airport (ONT) and Chino Airport were updated via data provided by Los Angeles World Airports (LAWA) and by a Master Plan-related study for Chino Airport (Coffman, 2003). LAWA is a branch of the City of Los Angeles who owns and operates ONT and reports, on a quarterly basis, CNEL contours for the airport to the state.

The federal and state governments regulate aircraft noise. Updated noise contours for airports other than ONT and Chino will be shown in each airport's Comprehensive Land Use Plan (CLUP) as they are updated by the County.

4.3.3.4 INDUSTRIAL NOISE

Industrial noise sources exist but do not materially affect noise-sensitive land uses within the unincorporated areas of the County. Where industrial use was nearby or in the vicinity of noise-sensitive land use, the field measurements included their noise emission. For example, sound sources for short-term measurement ST-22-2 in the City of San Bernardino included a heavy truck repair facility approximately one thousand feet from the closest noise-sensitive land use. Sound sources for short-term measurement ST-21-1 in Muscoy included mixed industrial uses approximately 500 feet from the closest noise-sensitive land use.

[5] Although the 1989 Noise Element also considered Trona Airport, it is not within the County and was not considered for this update.

4.3.4 CONCLUSIONS

Based on the results presented above, the unincorporated portions of the County represent the full range of community noise environments from very quiet rural to moderately noisy suburban to noisy urban. Noise patterns in the County are generally consistent with published data regarding the intensity of development/type of land use and the expected levels of environmental noise. Noteworthy however, is that the ambient noise levels for typical types of land use (e.g., normal suburban residential) measure several decibels louder than what the published literature suggests would be expected. It was not possible to determine the exact cause of this slight anomaly within the scope of this study. However, plausible speculations include:

- Literature in this topic area was published 20 to 30 years ago and may differ by several decibels compared to current real-world conditions (although ambient sound levels measured in 1987 and 2004 at comparable locations were similar);
- The most common source of environmental noise is from surface transportation and because it is a growing area, the County traffic has a higher percentage of noisier heavy trucks than "built-out" areas containing similar land use/density;
- The current phenomenon of large pickup trucks and sport-utility vehicles widely being used as passenger vehicles did not exist 20 to 30 years ago;
- Much of the County is flat and/or has little development, thus sound propagates farther without attenuation;
- Even rural, low density, noise-sensitive land use is located in proximity to roads and highways.
- Elevated ambient noise levels result from natural conditions such as high wind velocities that are more commonplace in the desert and mountain regions of the County.

4.4 CRITICAL ISSUES TO BE ADDRESSED

Noise/land use conflicts exist in the County, primarily where noise-sensitive uses are close to transportation facilities. The most prevalent examples are residences and schools. This problem area should be a priority concern in the formulation of future community noise policies.

The process imposed upon citizens wishing to express their concerns about and have governmental actions taken to resolve adverse noise issues (i.e. code enforcement) needs to be straightforward, coordinated, and streamlined. Issues of overlapping and/or gaps in jurisdictions and responsibilities should be investigated, evaluated and resolved to the benefit of all concerned parties.

4.5 REFERENCES AND RESOURCE DOCUMENTS

4.5.1 REFERENCES AND BIBLIOGRAPHY

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4.5.4 GLOSSARY

A-weighted, A-weighting filter – Refers to application of a filter that modifies the electrical response of sound measuring instruments to low and very high frequencies to emulate the human hearing response to sounds of low and very high pitch.

Ambient noise level(s) – (See Existing noise level)

Community noise – Sound of a type and character typically perceived in an urbanized area. Consists of natural sound and sound associated with human activity. Also called environmental noise.

Community noise equivalent level (CNEL) – The average equivalent A-weighted sound level during a 24-hour day obtained by adding five decibels to the hourly noise levels measured during the evening (from 7:00 p.m. to 10:00 p.m.) and by adding ten decibels to the hourly noise levels measured during the night (from 10:00 p.m. to 7:00 a.m.). In this way, CNEL takes into account the lower tolerance of people for noise during the evening and nighttime periods.

Day-Night Average Sound Level -- The average equivalent A-weighted sound level during a 24-hour day obtained by adding ten decibels to the hourly noise levels measured during the night (from 10:00 p.m. to 7:00 a.m.). In this way, DNL takes into account the lower tolerance of people for noise during the nighttime period.

Day – The period from 7:00 AM to 9:59 PM for the Day-Night Average Sound Level metric or the period from 7:00 AM to 6:59 PM for the Community Noise Equivalent Level metric.

dBA, dB(A) – Decibel, A-weighted. A unit of A-weighted sound pressure level. See A-weighted.

DNL – See Day-Night Average Sound Level

Environmental noise – (See Community noise)

Evening – The period from 7:00 PM to 9:59 PM for the Community Noise Equivalent Level metric.

Event – A discrete noise-producing activity.

Existing noise level(s) – The noise, resulting from natural and mechanical sources and human activity, considered normally present in a particular area. Generally consisting of noise from all sources both near and far. Also described as ambient sound level(s). Background noise level generally describes the mixture of indistinguishable sounds from many sources without any one dominating sound.

$L_{eq(t)}$ – The equivalent steady-state sound level that, during a specific period, contains the same sound energy as a time-varying sound occurring during the same period. The L_{eq} is the energy summation and average of sound energy during quiet and noisy portions of a measurement period (t) in seconds, minutes or hours. Because the L_{eq} represents an energy quantity in decibels, the numerical values of L_{eq} are added, subtracted, averaged, etc. in the mathematical energy domain using logarithms.

L_{dn} – see Day-Night Average Sound Level

Maximum noise level – Abbreviated L_{max}, denotes the highest amplitude root-mean-square (rms) sound level occurring during a measurement period.

Minimum noise level – Abbreviated L_{min}, denotes the lowest amplitude sound level occurring during a measurement period.

Night – The period between 10:00 PM and 6:59 AM

Noise – Subjectively defined as "unwanted sound". Occurrence at low sound pressure levels or at loud levels for brief isolated periods does not generally result in adverse effects or complaints. Sustained and/or repeatedly elevated levels are typically associated with nuisance and annoyance "to a reasonable person of normal sensibilities" and may result in adverse effects.

Noise abatement – Noise attenuation or other actions provided to reduce environmental noise.

Noise contour – A line drawn about a noise source indicating constant levels of noise exposure, Noise contours represent lines of equal noise exposure just as the contour lines on a topographic map represent lines of equal elevation.

Noise-sensitive land uses – Noise-sensitive land uses include, but are not limited to, residences, schools, libraries, hospitals, churches, offices, hotels, motels, and outdoor recreational areas. These typify land uses where suitability is restricted by intrusive noises. Hence, they are termed "noise-sensitive". Noise-sensitive factors include interference with speech communication, subjective judgment of noise acceptability and relative noisiness, need for freedom from noise intrusion to perform non-verbal tasks, and sleep interference criteria. The Land Use Element of the General Plan provides a description of the various land use throughout the County and is considered the source for the inventory of noise-sensitive areas.

Predicted noise level(s) – Future noise levels, resulting from the natural and mechanical sources and human activity considered being usually present in a particular area (i.e., ambient noise) plus the estimated future project-related noise.

Receptors – Noise-sensitive locations selected for determining noise effects. These locations should represent areas where frequent human use occurs, or is likely to occur in the foreseeable future (e.g., existing residence or vacant property for which development plans have received final approval). Also called "receivers".

Sound – Physically, very small rapid perturbations in ambient atmospheric pressure containing sufficient energy to physically move the eardrum. Perceptually, the acoustic sensation resulting from collection, detection, transmission, analysis, and interpretation of the small pressure changes by the ear-brain system. (Also see noise).

Sound Level Meter – A measurement instrument containing a microphone, an amplifier, and output meter, and one or more frequency weighting networks. It is used for the determination of sound levels. Includes more complex versions with digital memory (e.g., Community Noise Analyzer).

Sound level – The amplitude of a sound presented as a ratio of the sound's pressure squared to a reference pressure squared. The numerical value of the ratio is given in units of decibels. The numeric value of the reference pressure is 20 μPa (twenty micro Pascals) that corresponds to 0 decibels, representing the approximate threshold of hearing.

4.5.5 ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNA	Community Noise Analyzer
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
DNL	Day-night average sound level
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GIS	Geographical Information System
HUD	U.S. Department of Housing and Urban Development
Hz	Hertz (cycles per second)
I	Interstate (highway)
INCE	Institute of Noise Control Engineering
LAWA	Los Angeles World Airports
L_{eq}	Equivalent Sound Level
LT	long-term
ONT	Ontario International Airport
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
SLM	Sound level meter
SR	State Route
ST	short-term
TNM®	FHWA Traffic Noise Model